CANADIAN SATELLITE EXPO/ February 3 in Vancouver

MID MONTH MEMO

CHANGES. Our industry seems to be ever faced with changes; some important, some not so important. Here is one of the latter. Effective with the March issue of CJR, we are changing the name. It will be called **'CSD/2'** (our thanks to Ted Turner for the concept!) and CSD/2 will be mailed, automatically, to ALL domestic subscribers of CSD. This is in addition to the basic CJR subscriber list and the SPACE Dealer Members who receive CJR with their SPACE dealer membership.

MORE LAW SUITS. STTI attorneys have discovered SPACE was not properly incorporated between September 1982 and late January, 1984. Picking up on the 'oversight,' STTI's Rick Schneringer moved to reserve the 'corporate name' SPACE for himself noting that he would 'return the legal rights to the name, to the industry, **after** SPACE VP Rick Brown' had left SPACE.'

SPACE has countered the **original** STTI lawsuit with a filing requesting up to $1,000,000 for various alleged 'Breach of Contract' actions involving the breakup of the STTI/SPACE trade show agreement reported last month.

SPACE, meanwhile, reports over 300 booths reserved for their March 18-20 show while STTI reports nearly 350 sold for their show.

C-SPACE, the Canadian trade group and **Galaxy Guide** can be pleased with the **'First Canadian Satellite TV Expo'** held in Vancouver February 3-5. A follow-up show is promised in the Toronto area early in August.

FEBRUARY 1984

Cooper James Report

CJR is published and airmailed on the 15th of each month by West Indies Video, Ltd., a Turks and Caicos Corporation with corporate offices at Tower Plaza, Providenciales, Turks and Caicos Islands, Caribbean. **All subscription requests,** advertising requests should be directed solely to **CJR/CSD, P.O. Box 100858, Fort Lauderdale, Florida 33310.** This office is open weekdays between 9 AM and 4 PM eastern time and the telphone number is 305-771-0505 (ask for Carol Graba). CJR is the mid-month companion to **CSD** (Coop's Satellite Digest), the worldwide distributed international trade journal for the (home) TVRO/ SMATV industry. CJR subscriptions, alone, are $35 per year airmail in USA, Canada and Mexico; $45 elsewhere (US funds only). **When combined with CSD,** both publications are available via airmail to US destinations for $75 per year. You may charge this on your VISA/Mastercharge card by calling 305-771-0505 as noted above.

NEWS ABOUT PRODUCTS AND SERVICES

ANTENNAS

ATC/ANTENNA TECHNOLOGY CORPORATION (8711 Pinnacle Peak Rd., Suite C-103, Scottsdale, Az. 85255; 602/264-7275) has appointed Texscan Corp. of Canada as the 'exclusive distributor of Simulsat' antenna products in Canada. Contact through Texscan's Montreal office; 514/335-0152.

COMMANDER SATELLITE SYSTEMS (4369 Rathkeale St., Mississauga, Ont. L5M 2B5; 416/826-8066) is now shipping an 8 foot spun aluminum dish with an f/D of .25 and a claimed reflector/feed efficiency of 70%. Finished in a gold-alodyned surface, the dish claims reduced earth noise and terrestrial interference pick-up as well as having 'driven' the first side-lobe 'null' to precisely 2 degrees; where the FCC latest satellite to satellite spacing plan will ultimately have satellites located. The antenna has a spun (galvanized) backplate and is called 'The Eliminator.'

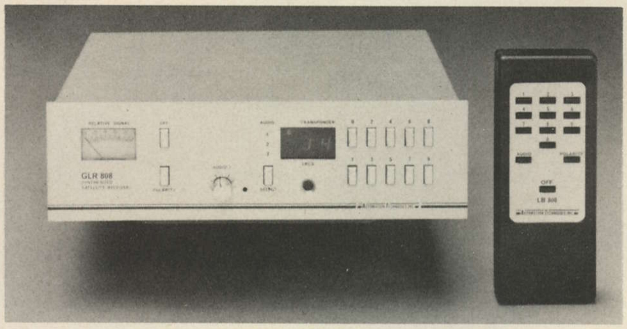
CONTINENTAL SATELLITE SYSTEMS (11485 S.E. Highway 212, Claskamas, Or. 97015; 800/331-2774) has introduced a 7.3 meter mesh antenna (24 feet in diameter). The antenna is described as lightweight (568 pounds), all aluminum construction and capable of being installed without a crane. Continental also manufactures antennas between 2.4 and 6.1 meters in size.

CONTINENTAL's 24 Foot Dish

DH SATELLITE TV (P.O. Box 239, Prairie du Chien, Wi. 53821; 608/326-8733) has announced a new .3 f/D (high efficiency) spun aluminum dish. DH is currently shipping 200 TVRO antennas and mounts per day.

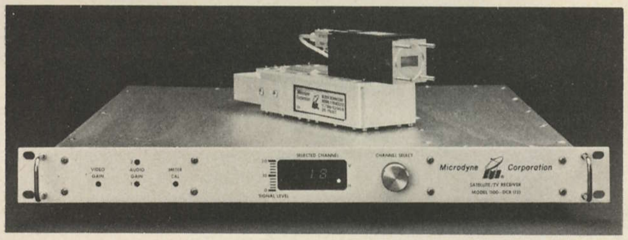
RECEIVERS

AUTOMATION TECHNIQUES, INC. (1550 N. 105th E. Av., Tulsa, Ok. 74116; 918/836-2584) has introduced their new GLR-808 receiver plus downconverter home receiver system that has infra-red remote control. The package, previously available only with a total AT system package, is now available for use with virtually any antenna system using conventional feeds and LNAs. The receiver features single-cable installation, a crystal synthesized tuning system for superior stability, automatic polarity selection, and an in-board tunable TI receiver filtering system to help control terrestrial interference.



AUTOMATION TECHNIQUE's GLR-808 Receiver

MICRODYNE CORPORATION (P.O. Box 7213, Ocala, Fl. 32672; 904/687-4633) has a new 72 channel Ku band receiving system consisting of their model 1100 BDC-12 down converter and the DCR-12 72 channel video receiver. The BDC unit down converts the 11.7 to 12.2 GHz band to the 270-770 MHz range (compatible with AVCOM and Scientific Atlanta block conversion systems). The 72 channel receiver is programmed with a plug-in PROM device which allows use of the same basic receiver with (selectable) either 4 GHz **or** 12 GHz antenna plus down converter systems.



MICRODYNE's Ku Band Package

MICRODYNE has also announced a totally new 'brochure' which describes their complete line of 4 and 12 GHz receiving equipment and systems, including antennas.

NTI/NEW TECHNOLOGY, INC. (29 Gum Street, Cabot, Ar.

NEW PRODUCTS/ continues page 14

NOTICE TO READERS

CJR is distributed free of any charge to Dealer Members of **SPACE,** (the) **S**ociety (of) **P**rivate **A**nd **C**ommercial **E**arth (stations). Non-dealer members of SPACE are charged a nominal annual subscription for airmail delivery (see page one, here).

OEMs (original equipment manufacturers) distributors and others selling to dealers are encouraged to submit news, new product and press releases to CJR (CSD) for consideration in this publication. For information, contact Carol Graba at 305/771-0505 (P.O. Box 100858, Fort Lauderdale, Fl. 33310).

Next month, March (15) 1984, CJR will be renamed as **'CSD/2'** and in an expanded format become the direct mid-month companion to Coop's Satellite Digest (CSD). Effective in March, all domestic readers of CSD will receive CSD/2 as a part of their CSD subscription service.

THE VIDEO SYSTEM INTERFACE

NOT ALL Alike

Most of us accept that out of a TVRO receiver we have pictures and sound; either together (i.e. on an 'RF' carrier, operating on a 'standard' TV channel), or, separately (i.e. one each video and audio output). And most of us understand that the basic **satellite delivered signal** is not compatible in technical format with our standard television receivers, and therefore our satellite receiver must 'process' the special 'FM' signal to reduce the complex transmission to its most basic parts; **separate video and separate audio.**

Very few of the early TVRO receivers were sold with a built-in modulator. The modulator is the gadget that accepts the basic video and audio and creates a TV channel 'signal' that can be plugged into a TV receiver. And in fact many of **today's** receivers either do not offer, or offer as an option, an 'RF Modulator.' Those receivers which are so sold expect you, the dealer, to locate your own 'RF Modulator' to complete the customer's system. As might be expected, a reasonably good business has matured offering low power and low cost 'RF Modulators' to the TVRO industry.

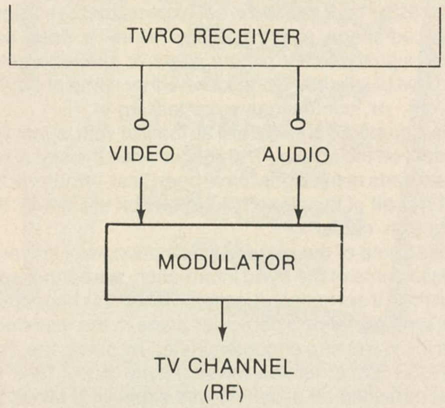
The present generation of TVRO receivers make an effort to produce the best looking video and the best sounding audio possible; within engineering and price constraints. That is the subject of our discussion; the 'quality' of the video, and the 'quality' of the audio which is delivered to you from the TVRO receiver. And the reason we are discussing this subject?

Dealers are pressed by customers to give them 'studio quality' pictures on as many transponders as possible. Actually, the common use of the 'studio quality' phrase is possibly in error since very few people have ever seen a 'studio quality' picture any place! Yet we all recognize that there is or can be a vast difference in video quality between such sources as a VCR tape deck, local broadcast stations, a video disc player or a satellite television receiver. Those customers who 'demand' **nothing less than the very best** are going to expect from you, the dealer, at least some extra effort with 'optional extras' for their systems. We intend to show you just what 'optional extras' are available, in the video and audio 'processing' fields, so that you will be better equipped to deal with customers who are demanding something 'extra special.'

SIMPLE First

Reviewing the basic and typical home system, the TVRO receiver creates separate video and audio signals (called 'baseband video,' and 'baseband audio') internal to the receiver. Some receivers bring these two separate signals to the rear apron of the unit where you can plug equipment in to 'display' those two separate signals. The video line can go to a VCR deck or a monitor; the audio line can go to a VCR deck or a sound system. Or, both, separate but together, can go to an external 'RF Modulator' to create a standard TV signal on a standard TV channel.

Other receivers offer only an 'RF Output,' which simply means **this** TVRO receiver has a **built-in** 'RF Modulator' and the only thing you can plug directly into the TVRO receiver is a standard television receiver. Still others offer both types of outputs.



STANDARD METHOD OF PLACING SATELLITE AUDIO/VIDEO ON TV SET

To be able to **further process** the video and/or audio signals for a customer's installation, you **must have** the two separate (video and audio) outputs to work with. If your TVRO receiver only offers an 'RF Output,' there is not much you can do to improve the 'quality' of the signal at that point; you can amplify it (make it stronger) so it can serve multiple TV sets, but you cannot undo what has already been done inside of the receiver's 'RF Modulator'; and that is where the quality-level of the reception is established.

This is an important point to keep in mind; once the separate video and audio signals have been 'married together' inside of a modulator, there is virtually nothing you can do to improve the acutal quality of the service for your customer. It must be done before a modulator, or alternately as we shall see, in place of a modulator.

VIDEO Processing

The standard baseband video signal coming from a video jack on the TVRO receiver approximates the **NTSC** video standards signal. NTSC is the technical term labeling the specific type of television transmission we have in North America.

'Approximates' because in truth by the time the video signal winds its way from the tape deck or color camera ahead of the uplink, through the uplink, into and out of the satellite, and then through your TVRO receiving system, several of the original 'studio' parameters have changed. Most of that change takes place in the TVRO receiver.

No part of the circuit (from camera to you) is 'opaque'; all elements, including the satellite, have an effect on the final video quality you receive. Let's examine some of the important parameters within the video signal.

1) **Sync.** The basic video information (the lines and lines of video data which paint onto the screen to form a picture) are like a bowl of jello when you take away the bowl. They have no direction or form. The sync signals (there are two sets) are traffic cops. They tell the video picture detail-information **where** to go, and, **when** to go. One set of sync tells the video information when to go left to right, on the screen. The other set of sync tells the video information when to go down or up on the screen.

The picture consists of millions of individual 'elements' or pixels. They have a sequence and follow one another in that sequence. They are 'painted' on the screen by the 'gun' in the picture tube from left to right, top to bottom. When a full picture has been painted on the whole screen, we call that a frame. There are, with NTSC, 30 frames per second and each frame depicts the changes (motion) which has occurred since the last frame was 'painted.' To keep all of these millions of individual dots or pixels in line, in the proper sequence, **we depend upon the sync signals.**

There is a master reference sync signal at the uplink. That master reference sync signal is in turn cross referenced by one method or

another to a 'standards signal' maintained by the National Bureau of Standards (NBS). Your television set expects that sync signal to have that referenced-shape and frequency. When it does not see the **proper** sync signal, the TV picture jitters or jumps or gets 'bent.' In effect, our bowl of jello has a crack and either some of our information is leaking 'out,' **or,** contaminants are leaking in.

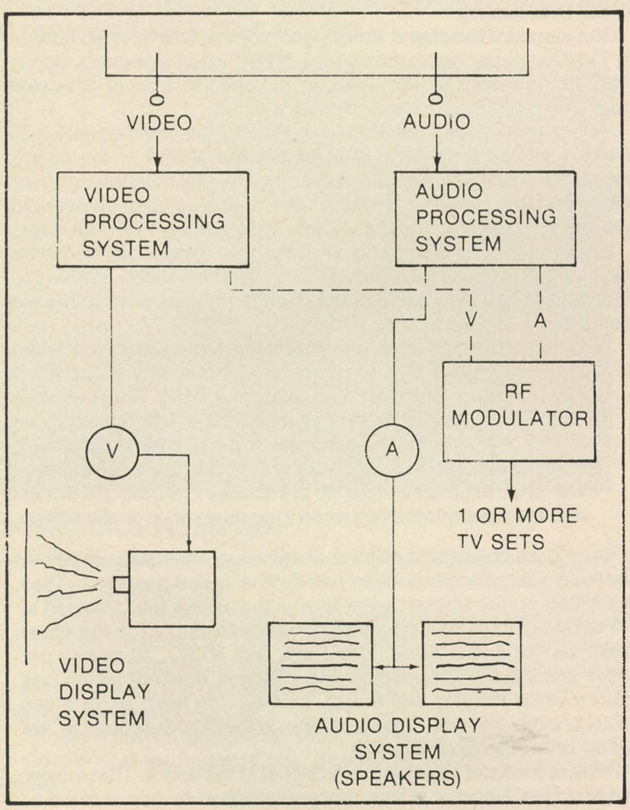
Noise is a contaminant. We are all familiar with 'sparklies' or black and white dots on the screen. They occur when the signal is weak and some minute parts of the signal have been 'lost.' When we have **some** signal, **but not all** of the signal, the television set 'fills in' the missing signal parts with 'noise.'

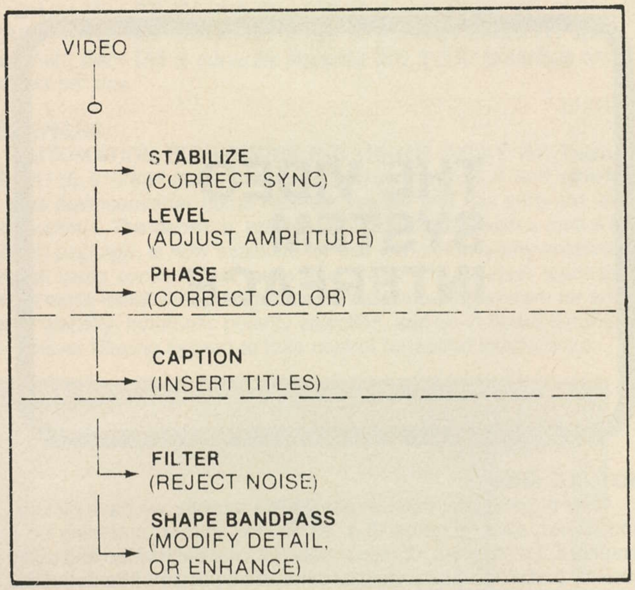
If we lose some of the **picture** information, we can see sparklies. When we lose some of the **sync** information, **we** cannot **see** anything missing but the TV set notices it is gone. When this happens the TV set **expects** a sync signal at a particular place in the 'painting process,' and if the sync is missing or contaminated by noise, the TV set burps or jitters. Noise fills in for the missing sync signal, and the TV set misses that particular bit of sync it was expecting. Minus the sync, it loses control of the picture briefly and we see jitter.

This is important to understand because there are ways, using auxiliary equipment, to replace missing sync parts. Remember that the uplink source has its own reference sync signal; a 'sync generator.' And that reference sync generator is itself directly or indirectly capable of referencing to a national 'sync standard' found at the NBS. It turns out that with modern solid state electronics, you can build a fairly low cost sync generator and it will be adequately accurate that you can generate your own sync on-premises. It may not be 'perfect sync' as broadcast or NBS standards go, but it will be sufficiently close to perfect sync that the TV set, if fed this artificial sync, will accept it as pure sync.

So here is our first option. We route the video from the TVRO receiver output to a box that creates new sync. This box is a 'sync generator' or sync 'restorer.' There are several different approaches available.

A) **Sync Generator.** The incoming signal has sync on it. But, some or many parts of the incoming sync are either missing or contaminated with noise. What we need is a circuit that takes





away (i.e. 'strips') whatever sync as may be remaining from the signal, and then substitutes new sync in its place. The new sync is locally generated. As we shall see in this series, there are boxes that generate **new** sync, and boxes that **strip** the old sync. **And there are boxes that do both.**

B) **Sync Corrector.** Modern professional video tape machines include circuits which 'sample' the sync constantly. They monitor the sync signal to be sure it is there, and to be sure that it has the proper form (i.e. no noise contaminants). When they detect that some portions of the sync are not present, or are somehow contaminated, the tape machines instantly substitute a new machine-generated sync signal for the missing or contaminated sync 'bit.'

The sync signals are on occasion called the 'time base' for the video signal. This means that sync has a particular job to do; provide a (timed) reference for the rest of the information so it all falls in line when and as it is supposed to do. When the sync signals are badly mangled in the transmission process, you can correct them with a machine called a 'Time Base Corrector' (TBC). This approach relies on constant monitoring or sampling of the signals, storing each line or four lines or 16 lines of signal (there are 525 lines in a textbook **complete** frame) to insure that all of the lines 'in memory' are properly formatted, and then the lines are 'dumped' to the screen while 4 or 8 new lines are stored and checked for proper format. This goes on very fast, constantly. When an improper line or two is noticed, the 'bad line' is dumped without ceremony and electronically a line above or below (with no imperfections) is substituted in its place.

Because of the memory requirement, and the very fast operating times involved, TBC units are not toys. They are expensive ($3,000 up) and they are subject to considerable operator and operational error. They are not plug-in and forget boxes. They also have no particular place in our discussion since between their price and operational complexity they quickly become unattractive to even the dedicated videophile home terminal owner.

If you accept that you can do **almost as well** by simply throwing away **all** of the sync you have coming in (rather than trying to replace only those parts that measure bad) and substituting new sync that is locally generated, you can give your customer jitter-free pictures even when the picture is laden with heavy sparklies; for under $500 additional cost. We'll look at some boxes that do this in coming months.

2) **Level.** The level or strength of the video signal is a little easier to identify with than the complex sync signals. This one should be fairly simple to keep in check; the typical 'RF Modulator,' and, the typical projection set or video monitor specify that the peak-to-peak video voltage shall be 1 volt. That's not much voltage; seemingly it would be not too complicated to attain.

Not very many TVRO receivers **actually provide** one volt peak to peak output, inspite of what they say. You measure this output voltage, from the video output jack, with a special voltmeter or more ideally on an oscilliscope. Many receivers (but not all) provide a video gain control (most are located inside on the video board) and if you have a way of **properly measuring** the output level, you can set that gain control. Most dealers do not have a 'scope' so if the video level control is touched, it is done with a 'it looks better now' approach. There are some problems with this.

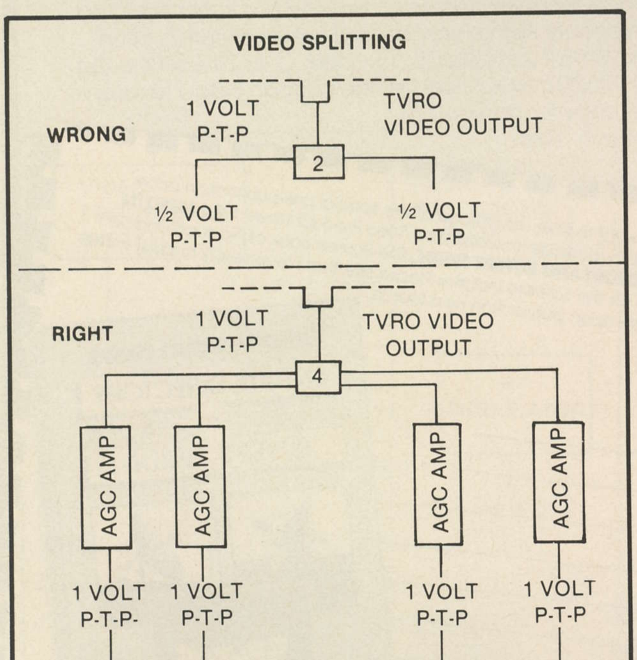
The one-volt peak-to-peak specification goes hand in hand with a color bar test pattern. The voltage level present is dependent upon the content of the picture to some extent. The signal should be clean (no sparklies) and we have to assume the uplink operator is properly operating his uplink transmitter and transmitter modulator. Those are not always valid assumptions.

When there is too much video output, you can overdrive (i.e. saturate or overload) equipment that follows; such as the input to a video modulator, or a VCR input. When there is an inadequate amount of video level present, you end up with a washed out (low contrast, low brightness level) picture. At extremely low levels, the picture will roll because the sync pulses are below the monitor's 'threshold.'

Many custom installations seek to take the TVRO receiver's video output and 'split it' to drive two or more separate pieces of equipment. Perhaps the customer has a VCR, a projection set that accepts baseband video drive, and then a modulator to send the TVRO signal to other standard receivers in the home. How do you take the video output from the **single** receiver output jack and 'split it up' into three parts? Will you have enough left, after splitting it up, to operate all three follow-on units?

If you have **only a pair** of devices to 'drive,' the cheap and dirty way to do it is to take a 'Y' connector cable from the local Radio Shack store and plug the male end of the 'Y' into the video output of the TVRO receiver. This will give you a pair of outputs at the female end of the Y cable adapter. Now you can go onto the two units that follow. That's the good news.

The bad news is that when you do this you are creating an impedance mis-match with the Y cable, plus you are improperly dividing the video signal itself. If you have sufficient 'reserve gain' inside of the TVRO receiver, you can **perhaps** turn the video output level up higher and get away with the mechanical 'Y' adapter split. Then again, you may not.



A far better approach is to select one of the relatively inexpensive 'amplified video splitters' on the market. In the professional world, they call such a device a 'Video DA (distribution amplifier)' and what it does is this. The single video input goes into the box where it is split into two, four or some number of outputs. Then **each** of the output sides of the 'split' are **individually amplified.** This individual amplification on each output leg provides 'isolation' between the outputs. That means you can do things on one output (such as short the line) and not cause interference on the other outputs. Isolation is important, even if you never short a line.

This is an 'active' device; that is, it includes amplification. This is unlike the 'RF splitters' we are more familiar with which merely divide the input signal into two or more parts, equally. It requires power (not much) and some of the units available also include audio splitters as well.

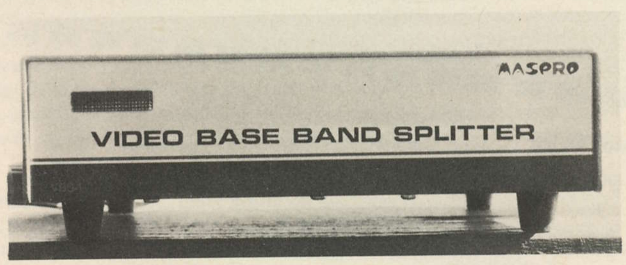
(One of the newer units available that should be of interest to TVRO dealers is the **VBS4** from **USS/Maspro;** St. Hilaire, Mn. 56754; 218/681-5616. This unit provides four separate video outputs, each amplified and leveled to 1 volt peak to peak; plus, four amplified and split audio outputs from a single audio input. We will look at several pieces of similar gear in some detail before this series finishes.)

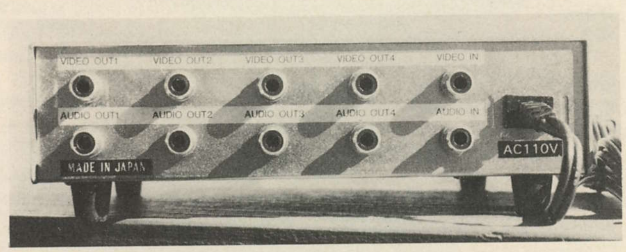
Level is simply a matter of insuring that there is neither too much nor too little signal (video signal) at the input of all of the equipment which must have access to the original video source. When the original video signal is going to be used two or more places, the signal must be amplified and split (divided) into the appropriate new levels. Failure to do this will almost guarantee too low a level to the equipment that follows with poor picture quality and perhaps attendant sync problems as well.

Automatic leveling circuits (Video AGC) are available for not much more than simple amplifier-only circuit systems.

3) **Phase.** The color signal transmitted with the North American (NTSC) format signals is quite complex. It is somewhat akin to a subcarrier carrying audio on a satellite TV transponder except that it is buried inside of the video information itself rather than being tacked on at the end of the video. Extracting the proper color information out of the color subcarrier is tricky. It is extremely easy to mis-adjust or mis-design something and cause the color to shift in 'hue'; turning faces blue and hair green. They call this 'color phase' and not all TVRO receivers get the color out of the receiver with the original 'phase' intact.

Most home television receivers and professional monitors contain their own 'hue' or phase control. This suggests that if you are not too





USS/MASPRO VBS4 is a single input, 4 output amplified video splitter with isolated outputs and video AGC. It also includes an amplified audio splitter with 4 channels.

concerned about asking the customer to readjust his hue/phase control when **switching from** satellite fed signals **to** VCR or off-air signals, you could simply leave this surgical corrective activity alone and let the customer sort it out. On the other hand, if this is a problem, there are boxes on the market which will take the raw video input and do 'phase correction' for you.

Once somebody has gone to the trouble of designing a box which adjusts video level (video AGC) and perhaps has supplied a handful of amplified video outputs, it is not much of a trick to add in a phase correction circuit as well. This brings out a separate control that 'skews' or 'twists' the complex timing relationship of the color subcarrier to the main carrier, allowing the control user to put the phase relationship back closer to where it was when the signal left the uplink source.

4) **Caption/Title Insertion.** We'll only touch on this subject here since it is a complex subject to itself. **It is possible** to route the video through an external titler or captioning box (typically with its own keyboard) so that video signals fed in the box can leave with a set of titles or captions or notes **on top of** the video.

For now, let's leave the subject with the notation that adding anything to the video (such as titling) requires that the character generator equipment **and** the video source **be compatible** in 'sync.' One set of video cannot be added to or married to another set unless both are using the same 'sync reference' signal. If your satellite fed signal sync is in New York and you are in Denver, you see the obvious problem. There are solutions, but they are expensive.

5) **Filtering.** Noise, in video, can be in two different areas. The occasional sparklie (noise) occurs when a specific bit of video (a pixel or two) is lost in the transmission path. This kind of noise can only be corrected by complex and expensive 'pixel substitution' techniques; the missing (replaced by noise) information is in turn 'filled in' by a substitute pixel taken from some other nearby portion of the picture. This requires memory circuits that remember what is on the lines immediately preceding the line with missing information, and systems that select a picture bit to 'fill in' where a bit has been lost. Expensive. Another type of noise is found within the video section of the receiver; it 'looks' different than sparklie noise. It has a 'fine grained texture' to it. This is 'baseband noise' and because it occurs within the demodulator itself and through the video amplifier stages of the receiver, it can be 'filtered.'

Inspite of efforts to 'filter' sparklies, caused by a weak transponder signal, they to date have defied 'filtering.' That is a shame since filtering is relatively cheap to employ and requires no special technology. **Baseband noise** and filtering go hand in hand. In fact, many of the present receivers available do employ various forms of baseband filtering. If you 'roll off' the baseband video using a filtering network, you can artificially control the 'depth' of the color and the apparent 'fine detail' of the picture the viewer sees. If you have a receiver that seems to lack high-contrast 'color-snap,' you **know** that the receiver's baseband filtering has been designed (or mis-designed!) to roll off the 'high end' of the video baseband range. At least one major brand of receivers promotes its 'soft color appearance' claiming that this is an advantage.

External filtering devices are readily available in the home VCR field. **Their purpose is to disguise imperfect pictures,** covering up blemishes in the video which would stand out with**out** the filtering.

A filter is a tuned network, a selective set of tuning devices which allow the user to re-arrange the video 'passband' or video energy. The video that leaves the uplink system is (we assume) close to 'standards-perfect.' If a 'soft-color' receiver has a filtering system that attenuates the higher frequency portion of the video, the picture loses that 'snap' that goes with 'studio perfect' pictures. You cannot bring it back with another filter external to the receiver, but you could use a filtering system to over-accentuate **some other portion** of the video baseband to semi-compensate for the 'soft-look.'

At best, external filters are systems to cover up video blemishes. They cannot **get back** some porton of the video that has been 'lost' within the receiver proper, but they can help cover up the lost portion so the customer is not able to discern that something is missing.

6) **Shaping Bandpass.** A series of filters, designed to accomplish a specific function, are called enhancement systems. If the video has been poorly processed prior to the network, and the picture has lost detail, and color-snap, it is possible with a **series of filters** to bring back at least the visual appearance of a proper picture.

The video signal is a fairly wide 'set' of signals, spread over a region from 0 MHz to approximately 4.2 MHz. The color portion of this is located towards the top end at 3.58 MHz. Think of it as a foot long ruler held out in front of you. 0 inches to your left, 12 inches to your right. If this 12″ ruler was a sound signal, everything dealing with the information in the sound signal would be bunched up around the 6 inch mark. There would be nothing important, contributing to the sound, below 5.8″ or above 6.2″. The video signal, on the other hand, has information **spread over the full foot ruler;** the detail (crispness) is contained in information between 0 and 2 inches; the black and white 'basic picture' runs from 2 inches to 10 inches with the color information sandwiched in around the 9 inch mark. Between the ten inch and 12 inch mark, we have only modest video information as the video 'drops away' to make room for the audio. This is a 'buffer zone' between the basic video and the basic audio.

Now you **can design** filter networks which can pass this entire foot long ruler, but you can also design filters that pass only portions of it; attenuating or taking away, for example, portions around 4 inches and portions around 7 inches. If you do this, you have not a 0-12″ ruler anymore; you have a ruler that measures 0-4″, perhaps 5 to 6 inches, and then 8 to 12 inches. You 'filtered out' or 'dropped' the information at 4.5 and 7.

Careful selection of **how** you design the filter can cause the video information **remaining after the filter** to dominate the picture tube. You can bring out the low end detail information, for example, making the picture 'super-crisp.' Some of the projection sets do this routinely since the picture is being blown up so large that it naturally loses any kind of crisp look. Electronically, using filters, the crisp look is returned to the picture by reducing the rest of the signal lower.

In the trade, they call such gadgets 'enhancers' and an entire catalog full is found in the home VCR industry. Many are cheaply conceived and may actually do more damage than good, acting more as 'blemish covers' than true enhancers. **A few** have the designed-in ability to make a poor picture look good or a good picture look great.

The proof of any video processing system is what it appears to do to you and your system customer as you install the home system. We'll look at that in some detail as this series continues.

FM SCPC/ WHAT IS IT?

SATELLITES That 'Talk'

Several years ago, when satellite television was new and everyone was learning, there was a flurry of interest in non-video satellite services. In several of the early STT manuals circulated in the 1980/81 era, entire chapters were devoted to the systems required to bring down from the birds network radio services, wire service (UPI and AP) 'Teletype'® and a host of other 'narrow band' satellite links.

In the intervening years the intense interest in video has overshadowed what was a growing interest in non-motion, non-video services and information concerning the available services became more and more difficult to obtain. Today very little is known about the current state of those services, or the type of 1984-type hardware required to bring those services into a private location.

There has always been two separate methods of transmitting 'narrow band' material via satellite. In 1980, one of these formats (SSB/SCPC) predominated while another, perhaps technically better and technically more complicated, FM/SCPC, was a newcomer. In the interim years the FM system has taken hold and most of the high quality audio and data links in use today on both domestic and Intelsat satellites rely on this frequency modulation system.

Let us first define the market for such services since as system dealers we must always equate what is available to 'who we can sell it to' as a business activity. Then we will take a preliminary look at the equipment required and where you go to find that equipment.

RADIO Networking

The development of radio networks in the late 20's and eary 30's provided the foundation for the modern day broadcasting industry we have in North America. And radio networking depended upon the ability to inter-connect two or more radio broadcasting statons so that each could release or transmit the same program at the same time. The economies of networking are considerable; networking allows a massive, national or international audience to participate in the same event or program at the same time. It also attracts national advertisers who in turn can build their own product distribution programs around their abilities to reach millions of homes instantaneously.

Radio networking depended for years on the Bell Telephone Company landline network for inter-connection. In heavily populated areas, coaxial or other types of cables carried radio network signals from town to town and city to city, dropping off the 'feeds' at each community where there was a local broadcast affiliate. The broadcaster in turn would dedicate one (or more) audio 'lines' on his control console to the directly-connected network service line and the on-air engineer would, on cue or at an appointed time, simply fade down the audio from the local programming and 'bring up' the audio from the network programming. In this way local news and programs were integrated with national news and programs to make up the full broadcast day.

In more remote areas where the population density did not justify the dedication of full time 'wire lines' to radio network program carriage, stations were dependent upon either a microwave interconnection, for their network 'feeds,' or alternately, on picking up the over-the-air broadcast from another station affiliated with the same network, using an 'off-air' receiver. In either case, the end result was the same; the audio from the feed terminated on the control room console and the operator on duty could switch to the network feed as the radio station's schedule dictated.

It is and has been standard practice for the network operators (Mutual, ABC, et al) to pick up the 'tab' for the inter-connection service. This means that the networks have always been large users of Bell circuits, and their bill to use those circuits has been substantial. Bell likes to plan circuits and systems a decade or more ahead, and when Mutual (for example) went to Bell in 1960 with their network service plans, they were talking not about the network service plans for 1960, but rather for **1970.** Getting Bell to move 'faster' was not impossible, only expensive. The Bell network, as wonderful and reliable as it is, does not lend itself to inexpensive, **rapid**-change. so when a special event came along that required monstrous re-routing of network services, there were monstrous charges associated with the changes.

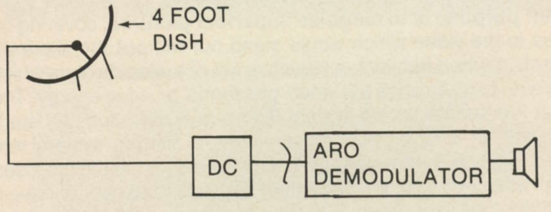
Bell also has always been 'network quality line' limited. While it is possible to send human speech ('voice grade') material over a standard telephone line, the standard telephone lines lack several important parameters which are required for **quality** radio networking. Bandwidth is one of those limitations; the standard Bell telephone circuit is typically capable of 'passing' audio only in the 50 Hz to 3,000 Hz region with good clarity. Most musical programs contain passages which far exceed this relatively narrow bandwidth; a 15,000 Hz bandwidth is more in keeping with what we normally call 'high fidelity' audio. To handle this, Bell circuits have to be specially 'equalized' using equipment which is dedicated to broadcast circuit use. Even human speech suffers in a **normal** telephone interconnect; you can hear the difference yourself when a radio announcer is interviewing someone on the telephone and his voice is transmitted to you through his in-studio microphone while the other voice is coupled out of the telephone. The telephone source voice has a 'tinny' sound, when compared directly to the in-studio microphone voice. Thanks to modern electronic audio processing equipment, some of this can be artificially corrected today but the correction is limited to handling the human voice range and does not extend to the musical instrument range.

It was a natural, then, for radio networks to look with favor on the establishment of satellite linked inter-connection systems. First of all, the circuits compared very favorably in cost to Bell landline circuit rental; if you 'amortized' the costs over 5 to 7 years. Second of all, satellite links could be (and were) designed from the ground up to be capable of handling all of the audio range required (20 Hz to 20,000 Hz is not an unusual specification). Next, whereas most radio networks rely primarily on one 'circuit' for most of their transmission needs, there are occasions when a second or third circuit would give them the flexibility they need to do a better job. Satellite links can be 'stacked' with two or more channels for a minimal increase in cost. This gives the networks an expansion capability, on short notice, which they never had with terrestrial landline circuits. And finally, while landline networking was barely able to handle 'high fidelity' monaural audio (with some difficulty), using satellite circuits the networks could stack a pair of separate 'channels' and send stereo service just as easily as they were sending mono over on the landlines.

The Mutual Radio Network was the first of the 'big four' radio networks to invest heavily in the satellite linking project. Mutual began in 1978 with a proposal to equip its affiliates with modest-sized dishes (ten feet in diameter). **At the time** of the proposal the FCC was **not** allowing **anyone** to use ten foot dishes for anything; you still had to have a satellite-receiving-terminal 'license' and the Commission's view of small dishes was that they did not meet their technical requirements. It was at about the same time that cable system operators and the first wave of private terminal owners were trying out dishes in the 10 and 12 foot region; and it took the combined 'weight' of all of these factions to convince the FCC that smaller dishes were 'OK.' Mutual played a substantial role in our 'non-license' status we enjoy for home TVROs today simply because they were aggressively pushing the FCC to approve dishes in the ten foot region.

Since 1978, radio networking has grown up dramatically. Some of the networks supply their affiliates with small **'ARO'** (Audio/receive only) terminals. Others provide the satellite service but require the affiliates to purchase their own terminals. Major suppliers of ARO terminals include Scientific Atlanta, Microdyne/AFC, California Microwave and others.

The basic ARO terminal consists of an antenna plus LNA, a down converter, and a special 'ARO' terminal demodulator. The system, up to the demodulator, looks like and in fact works just like your typical ten foot region home TVRO. Very few of the ARO terminal systems are



DEDICATED 4' ARO DISH OFFERS QUALITY FM/SCPC SERVICE WITH SMALL DISH

EARTH STATION REMOTE CONTROL RECEIVER

ESR240 INFRARED REMOTE CONTROL RECEIVER

In the Drake tradition. . .The ESR240 infrared remote control earth station receiver incorporates the latest technical innovations and built-in features while continuing time-honored Drake styling and impeccable workmanship. The ESR240's standard features set it apart from all the others: • Infrared remote control • Attractive styling • Digital LED display • Touch "memory" switches with LED indicators • Fixed and variable audio tuning for all subcarriers • Channel "scan" function • Crystal-controlled modulator — Channel 3/4 • Full metering • Automatic TV/Satellite antenna switching • Polarotor T.M. I interface with format indicator • Electronic polarity adjustment.

Add the performance and remote control versatility of the ESR240 to your satellite earth station. The Drake ESR240 will be the standard of excellence for years to come. Demand a Drake!

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PIONEER MEMBER OF SPACE

equipped with motor drives, however, since the radio stations (and others) using these services don't move around the sky looking for feeds; the feeds are dedicated to specific transponders on specific birds fulltime.

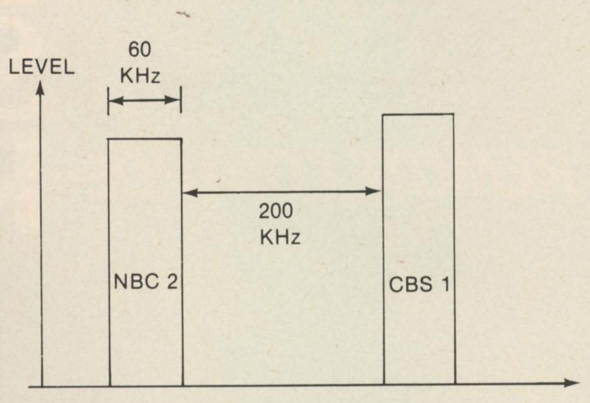
The 'ARO Demodulator' is an interesting piece of equipment. There are quasi-standards in this field and the most frequently utilized standards place the individual audio or data signals inside of a transponder (such as TR3 of Westar 4) 200 kHz apart. The individual 'channels' occupy a bandwidth of 60 kHz. How do these numbers relate to TVRO/subcarrier audio?

First of all, if the transponder has no video, then the entire transponder can be divided up into a sub-world all to itself. The satellite operator (i.e. Western Union) can look at his 36/40 MHz of transponder space and **he** can decide which service **he** wishes to assign to what frequency within that transponder. In effect, whereas the FCC does the 'frequency-allocating' for terrestrial broadcast services, the satellite operator becomes 'the FCC' for the on-transponder services. The services are assigned space or a specific operating (uplink) frequency. So far this sounds pretty much like United Video's carving up of the 'subcarrier spectrum region' on WGN's TR3 transponder of F3R. The subcarriers on F3R differ considerably, however, from the 'stand alone' FM/SCPC carriers found on TR3 of Westar 4. The F3R subcarriers are actually **married to** the video carrier, and they in essence run along with the video 'free of charge.' The uplink operator has to be concerned only that he keeps his subcarriers sufficiently spread out that they do not 'cross-talk' to one another, and to insure that as he adds new subcarriers he does not 'rob' too much power away from the video carrier (each audio subcarrier added to a video carrier reduces the effective power of the video carrier).

The FM/SCPC service allows each of the network services operating within a transponder the ability to uplink their own signal. In effect, if you had 20 different radio network signals on a transponder, each independent in content from the other, you could also have 20 separate uplinks **all sending signals** to the satellite. Those uplinks could be all in one geographic region (i.e. New York City), or, they could be spread (as they typically are) from coast to coast. So **that** is a difference.

Another difference is that the bandwidth of the FM/SCPC services is far narrower than the subcarrier audio service; rather than being as much as 300 kHz wide (i.e. Disney), the FM/SCPC carriers are pretty much standardized domestically to a 60 kHz bandwidth. This simply means that if you try to use a receiver designed for one service to tune in the other format, you won't recover proper (or any) audio.

But the major difference between subcarrier techniques and stand-alone SCPC techniques; **with subcarrier operation,** first you have to receive (and demodulate) the video carrier. Once you have the video demodulated, **now** you can go to a 'second demodulator' and extract the audio from the video signal. In effect, inside your TVRO video receiver you have **two separate** receivers; one that makes pictures, and having made pictures, another that makes sound. The FM/SCPC format is more akin to your standard FM broadcast service; each individual station 'stands alone' and you tune it in with a master tuning dial. In fact, the only significant operational difference between tuning in a dial full of FM broadcast stations on a home tuner, and tuning in a transponder full of FM/SCPC signals is that you are tuning the satellite frequency band (indirectly) with the 'ARO' receiver; rather than the FM broadcast band.



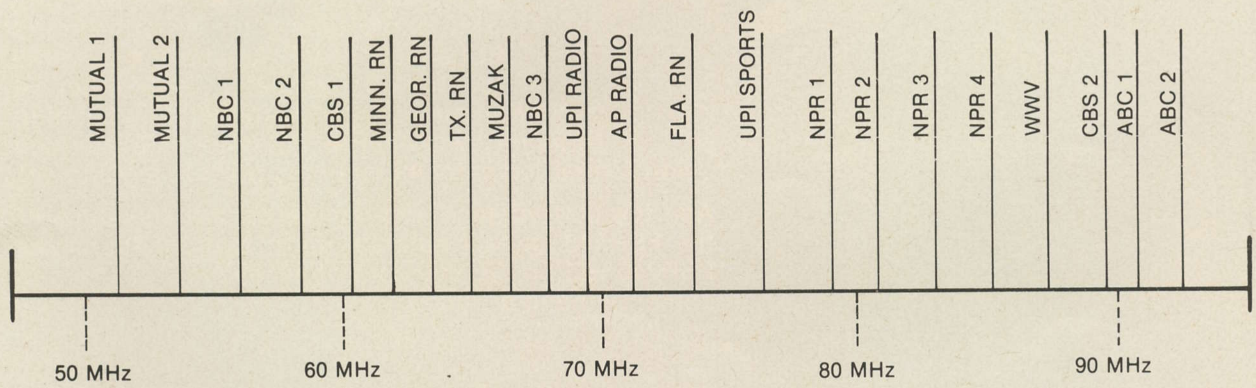
FM/SCPC SERVICES CAN BE FOUND SPACED, TYPICALLY, 200 KHz APART (CENTER TO CENTER) WITH EACH 60 KHz WIDE.

This tells us that what we need to receive 'ARO' service is a receiver which operates like a standard FM tuner/receiver, except that it does it in the 'satellite TV band' and with the bandwidth system which the typical radio networking link uses. And that brings us back to the typical 'ARO' terminal.

THE System

There are two major differences between an FM broadcast band tuner/amplifier, and, an 'ARO' receiver/tuner.

1) The FM broadcast band is 88-108 MHz (in North America); the satellite band is 3,700 to 4,200 MHz;
2) **Some** (but not all) of the satellite FM services (**sFMs**) employ

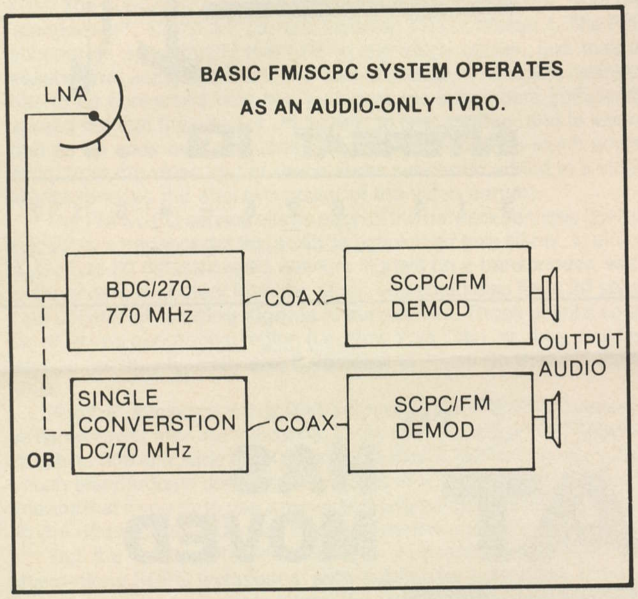


TYPICAL (NOT ACTUAL) FM/SCPC SINGLE TRANSPONDER SERVICE ASSIGNMENTS

the same 30 Hz 'energy dispersal waveform,' or dither, which **most** of the video services use. This is an FCC requirement (although not all follow it); a system to reduce the likelihood that a satellite signal in the 3.7 to 4.2 GHz frequency range will interfere with a terrestrial (Bell) link in the same frequency range.

The smart approach is to shift the satellite frequency range to a much lower frequency range; just as we do with TVROs. This requires a down converter (after the LNA). There are two possible approaches here, just as with TV:

1) **Shift the full band** (3.7 to 4.2 GHz) to a lower 'block of bandwidth,' say 270 to 770 MHz (i.e. AVCOM, Scientific Atlanta, some of the newer Microdyne receivers). Getting the satellite 'band' down to a lower frequency range makes it far easier to 'transport' the satellite signals from the antenna/dish (where the down converter is located) 'inside' to the demodulator portion.
2) **Shift just one transponder** at a time from its assigned frequency range (say TR3, 3840 to 3880 MHz) to a lower 'IF' range such as 50-90 MHz (70 MHz center frequency).

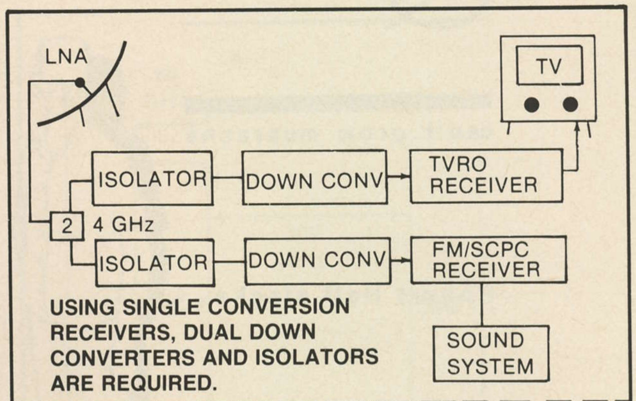


BASIC FM/SCPC SYSTEM OPERATES AS AN AUDIO-ONLY TVRO.

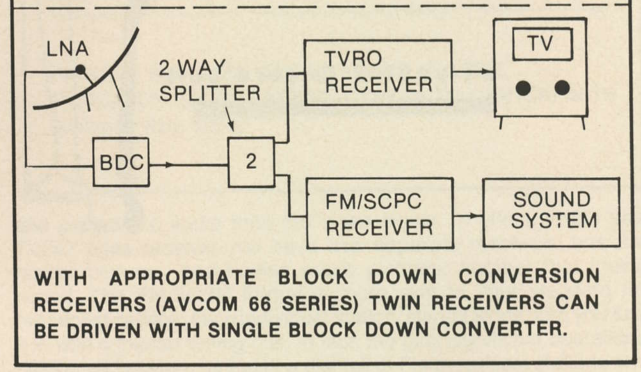
Once the signal is shifted in frequency to a lower intermediate frequency (i.e. IF) we can then build a receiver which 'tunes' that IF region; say 270 to 770 MHz, or, 50 to 90 MHz. It turns out that in a block down conversion system (such as 270-770 MHz IF) we are still asking alot of receiver design engineers to turn that relatively high (UHF) frequency range signal(s) into video, or audio. So the BDC is usually an intermediate step; after the 270-770 MHz IF which leaves the antenna mounted down converter, we have a second 'conversion' of frequency inside of the demodulator. The 270-770 range then becomes 70 MHz where not the **full** band **but one transponder at a time** is processed. So whether we start out leaving the outdoor down converter at 70 MHz (so-called single conversion system), or, we first block convert to 270-770 MHz, and then after transporting the 'block' inside reconvert a second time to 70 MHz, we usually end up at the 'standard' 70 MHz IF anyhow.

So here we are building an FM 'tuner' which will cover the frequency range of 50-90 MHz, nominally. We process the audio-loaded transponder, with perhaps several dozen separate and distinct radio network type signals, to a standard 70 MHz IF (which is actually an IF that centers on 70 MHz but which typically covers from 50/55 to 90/95 MHz). Then we build our FM tuner, following the specifications adopted for sFMs. This is your basic professional grade FM/SCPC receiver.

Which brings us smack up against the first substantial problem with the system; **frequency stability.** Early TVRO receivers had



USING SINGLE CONVERSION RECEIVERS, DUAL DOWN CONVERTERS AND ISOLATORS ARE REQUIRED.

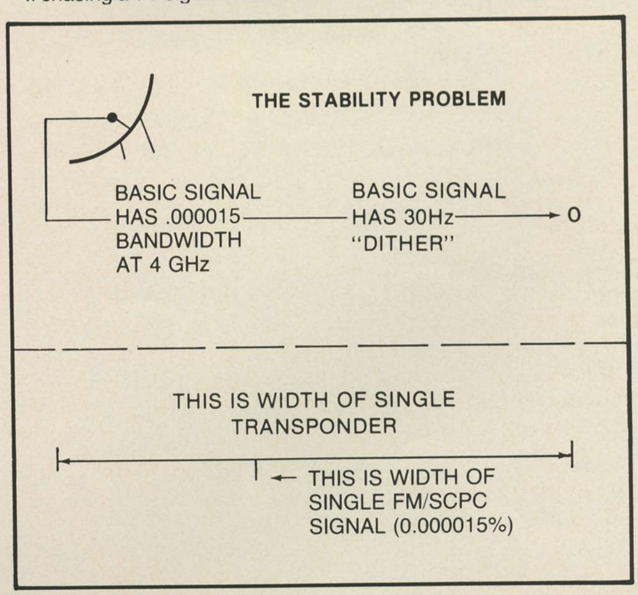


WITH APPROPRIATE BLOCK DOWN CONVERSION RECEIVERS (AVCOM 66 SERIES) TWIN RECEIVERS CAN BE DRIVEN WITH SINGLE BLOCK DOWN CONVERTER.

something called 'drift.' This meant that the user had to touch-up the channel selector tuning control every few minutes, or 30 minutes, to keep the signal 'tuned in.' A microwave receiver has many demands placed on it; staying tuned on the right signal, all of the time, is one of those demands. A circuit called **'AFC'** (automatic frequency control) was the answer. By using the television video signal received by the demodulator as a 'reference,' the AFC system **constantly monitors** the frequency-centering of the received signal. If the centering moves because some of the circuits in the receiver are not totally 'stable,' the AFC corrects the tuning; automatically. That ended the constant across-the-dial chasing most of the early home TVRO receivers had. Unfortunately, this technique requires that the receiver have a standard video signal to reference to. The typical sFMs transponder has **no video signal present;** there is no reference.

If chasing a TV signal across the dial was no fun, chasing an audio

THE STABILITY PROBLEM



signal across the dial is no-fun-squared. The TV signal is very 'wide'; the audio signal is very 'narrow'.' It is far easier to keep your eye on a moving basketball than a moving ping pong ball. In simple terms, without AFC the ARO receiver constantly moves about and the desired audio signal is bouncing all over the dial. **Not a saleable product.**

Clearly, an ARO AFC was required. but how to do it without driving the costs up very high? One technique is to build your own local reference signal into the receiver. The internal reference signal approach works on the theory that it is not the satellite signal that is drifting or moving about; it is the receiver itself. To be specific, the 'local oscillator' is not totally stable with changes in operating temperature, nor time. So if you cannot 'borrow' the stability of the incoming video carrier signal as a reference, you build your own reference.

The next problem is the 'dither' or energy dispersal waveform. This is a form of 'scrambling' placed on 'all' carriers (says the FCC) to make terrestrial microwave and satellite microwave compatible. They both share the same band, as TVRO installers who have had 'TI' (terrestrial interference) problems are aware. The 30 Hz energy dispersal waveform drives the relatively narrow (in bandwidth) audio carriers 'crazy.' It complicates creating a good, stable, 'AFC' system. It must be eliminated (i.e. clamped) in the receiver or nothing will work properly.

We'll look at how all of this sorts out when we continue this series with an equipment evaluation using the Hero Communications Model SCPC 66 receiver.

NEW PRODUCTS/ continued from page 2

72023; 501/843-8205) has announced a pair of new 4 GHz TVRO receivers; the 'Revolution I' and the 'Revolution II.' Model 'I' is a single conversion 70 MHz IF receiver with a claimed threshold sensitivity of 7 dB C/N and a VHF channel 3 or 4 modulator. Audio subcarriers from 4 to 8.5 MHz are tunable. Model II is the same basic receiver with the addition of narrow and wideband audio, Matrix A and B stereo reception. Both use a companion, weatherproof sealed outdoor down converter.

SAT-TEC SALES, INC. (2575 Baird Rd., Penfield, N.Y. 14526; 716/586-3950) has a number of dealer-oriented announcements. Effective immediately, all Sat-Tec equipment has a full one year warranty policy. Covered are all parts and all labor. Sat-Tec is also offering dealers using their products a new 'co-op' advertising program. Under the plan, dealers who purchase for resale Sat-Tec products will build credits towards local advertising which features or includes Sat-Tec TVRO units. A 'camera-ready' art kit, ready for dealers to use in advertising Sat-Tec products, is available for the asking along with full 'co-op' details. Sat-Tec has also packaged a pair of their units, the R5000sp satellite receiver, and, the S5000 stereo demodulator, into a system which carries the suggested retail price of $599 (a savings of more than $100). Details of dealer cost for the package are available directly from the firm.

SAT-TEC's $599 Retail Package

ACCESSORIES

CZ LABS (55 Railroad Av., Garnerville, NY 10923; 914/947-1554) is currently supplying the TVRO industry with a large line of RG-213/U coaxial cable jumpers with crimp-on 21B/U connectors on both ends. The assemblies are weather protected with shrink tubing. Stock sizes are 2', 3', 6', 8', 10', 15' and 20'; other sizes can be made up to order.

CZ LABS/ pre-made 213/U jumpers

PROGRAMMING/Publications

FANTASY CHANNEL through Space Age Video Distributors (14824 Camden Av., San Jose, Ca. 95124; 408/559-8812) is scheduled to premiere X rated adult programming February 16 on Westar V, transponder 6. The Thurs./Fri./Sat./ and Mon. schedule will run from 12 PM (midnight) eastern time. Charges will be $150 per year plus a $125 decoder deposit. SPACE AGE, as distributor, will offer a complete TVRO system for $1950 retail for the package (system dish size and other specifications unknown). Fantasy calls its service 'DBS' which may cause it some marketing problems; included in February fare is 'Deep Throat,' 'Green Door,' and 'Devil And Mrs. Jones.' For Canadian viewers, 408/370-1515.

GALAXY ONE MAGAZINE (P.O. Box 1338, Englewood, Co. 80150; 303/761-7930) is getting the jump on the proposed HBO/CBD 'DBS' package planned for Hughes Galaxy 1 satellite late this year. The new guide features all of the **Galaxy 1 programming sources** (including those announced but not yet 'up') and is intended for the direct marketing assistance of dealers and programmers who will be selling dedicated Galaxy 1 systems in the months ahead. Subscription price is $25 per year.

KAUL-TRONICS (Route One, Box 292, Lone Rock, Wi. 53556; 608/583-4833) is going 'to the bird' on Wednesday March 7th (7 PM CST) and again at 5 PM March 12th on F3R, according to announcements. Kaul Tronics has purchased the satellite time (transponder 18) to promote its antenna systems line. To attract interest, they have turned the bulk of the hour purchased over to a panel of industry people who will assess the state of the TVRO industry for 1984. Included in the group to be discussing the industry are Lloyd Covens of **Channel Guide** and Chris Schultheiss of **Satellite TV Magazine,** plus Peter Dalton (KLM), Sally DiDonato (NSC), Taylor Howard (Chaparral), Jacob Inbar (Cal Amp), Chris Kalmbach (TDS), John Kaul of Kaul-Tronics, and, Rick Schneringer of STTI.

NATIONAL MICROTECH (P.O. Drawer E, Grenada, Ms. 38901; 800/647-6144) has released a new publication titled **'Satellite TV Buyer's Guide.'** The publication is designed to gently take the potential TVRO consumer through the often complex world of TVRO 'lingo' and 'equipment' and can be used as a selling or hand-out tool for dealers. Prices run from $1.60 per copy (25 minimum) to $1.30 per copy (100 lot). The publication has 34 pages.

DISTRIBUTOR Reports

ChannelBeam (Unit 33, 147 Citation Drive, Concord, Ontario, L4K 2P8; 416/738-1162, or 800/268-1242) has launched the 'Shuttle Program,' a dealer support service built around a $50,000, 30 foot, mobile showroom which demonstrates home TVRO systems and equipment. With a mobile video-theater, and a permanently installed TVRO antenna system, the firm is creating a dealer network throughout Canada. A system of 'master sub-distributors' has been created

and these outlets will be equipped with near-identical 'Shuttle Program' mobile units for each Province. Luxor receivers, 7.5 foot Microform dishes as well as 9 and 10 foot dishes are in the packaged line.

CHANNEL BEAM/ mobile display rig

NATIONAL MICROTECH (P.O. Drawer E, Grenada, Ms. 38901; 800/647-6144) has re-named its National Repair Center as 'National Service Center' and has added in-house training facilities for the Apollo Representative Training School (ARTS) covering repair of Electrohome satellite products, Automation Techniques receivers, Saginaw Steering actuators, R.L. Drake receivers, KLM receivers and all Apollo receivers and lifts. The new National Service Center, with training facility, is located in Fayetteville, NC.

SATELLITE RECEPTION SYSTEMS (145 Columbus Rd., Athens, Oh. 45701; 614/594-2524) reports it has the new Luxor 9550 receiver in stock as well as the Luxor 9534 Tracker V and the 9536 Infra-red 'Remote Eye.' The 9550 has an extended threshold system as well as narrow or wide band audio. Complete remote control is also featured. SRS also announces they have the MTI 2800 actuator dish control system which has up and down (east and west) controls, LED readout and the ability to upgrade to infra-red remote control.

WESPERCOM GROUP LTD. has opened a new distribution center in Redding, California at 6651 Eastside Road. Sales and service will be handled out of the Bend (Or.) office but dealers in the northern California region will now be able to pick up equipment in Redding. Wespercom also recently introduced their new dealer financing program at a one day seminar held in Coeur d'Alene, Idaho. And in Penticon, British Columbia, Wespercom has a new 11,000 square foot facility with a built-in dealer showroom. Orin Beebe is the Canadian operations manager.

PERSONNEL

GUY T. CAYTON is the new President of International Micro-Cable, the SMATV/private cable sales and engineering arm for National Microtech. Cayton has previously been VP of Engineering for the firm and General Manager of the National Microtech Service Center in Fayetteville, NC.

RICHARD D. SPILLERS is the new President for Birdview Satellite Communications, Inc. Previously he was employed for 16 years by Touche Ross & Co., as Director of Audit Operations, in Kansas City, Mo.

LARRY DUKE has been named National Sales Marketing Manager for Satellite Reception Services in Athens, Ohio. He comes to SRS from Odom Antennas in Beebe, Ar. where he served for 2-1/2 years as National Sales Manager and VP in charge of Commercial Equipment.

PETER W. DRAKE is the new Chairman of R.L. Drake Company in Miamisburg, Ohio and **Ronald W. Wysong** is the new President. Drake had served as President of the company since 1976; Wysong started with Drake in 1963 and was most recently Executive Vice President.

NANCY A. TURPIN-SHERWOOD is the new Director of Public Relations for Odom Antennas, Inc., Beebe, Ar. Prior to joining Odom, Ms. Turpin-Sherwood served as editor for **Satellite TV Opportunities Magazine.**

ROBERT L. BERRY has been appointed to the Board of Directors of Franklin Signal Corporation, Clear Lake, Wi. Franklin acquired Satellite Communications Corporation during 1983; the firm was founded by Berry and manufactures and markets TVRO systems hardware.

SANDY WEEGAR has been appointed Executive Associate at Microwave Filter Company, East Syracuse, NY. Ms. Weegar has been with MFC for eight years.

BUSINESS NEWS

Birdview Satellite Communications, Chanute, Ks. reports its third quarter earnings, for the period ending December 31st, were 'down' from the previous quarter. Charles A. 'Bud' Ross, company Chief Executive Officer attributed the downslide to a retooling for new mutliple-receiver systems. Birdview recently introduced a package that allows more than one TV receiver to have independent access to a TVRO antenna system and according to Ross the changeover to the new product line "did not go as quickly as planned." Birdview is traded in the OTC (Over The Counter) stock market. Birdview is presently producing and shipping approximately 60 of the new multiple-receiver units daily.

CALENDAR/Through March 31st

FEB 18: Wespercom Group Winter Educational Seminar, Coeur d'Alene, Idaho (call 503/389-0996 for reservations).

MAR 6/7: Shuttle/Space Stations Business Opportunities Conference, Arlington, Va. (call 800/424-2908).

MAR 10: Wespercom Group Winter Educational Seminar, The River House, Bend, Or. (call 503/389-0996 for reservations).

MAR 18/20: SPACE (Society of Private And Commercial Earth stations) Las Vegas spring trade show, Caesars Palace Hotel. Educational seminars, exhibits, banquet; (call 202/887-0605 for reservations and registration).

MAR 20/22: STTI (Satellite Television Technology International) Las Vegas spring trade show, Riviera Hotel. Educational seminars, exhibits; (call 405/396-2574 or 800/654-9276 for reservations and registration).

MAR 20: American Bar Association Cable TV Committee day-long video-conference on legal problems facing cable television industry. Details from Barbara O'Neil, 202/362-1140.

MAR 31: Wespercom Group Winter Educational Seminar, Kent Washington; (call 503/389-0996 for reservations).

BIRD ACTIVITY REPORT

134° W, G1: Further loading of Galaxy 1 transponders will continue through February and March. CNN, CNN-2 currently being 'taken down' on Long Island courtesy of HBO, from F3R, and re-shot to Galaxy pending completion of Turner Galaxy-dedicated uplink in Georgia. WTBS appearance on G1 will not begin **full time** until this uplink is finished.


NASA
KENNEDY SPACE CENTER
The Paraclipse 4.8 meter satellite antenna was installed atop NASA's Central Instrumentation Facility, at the Kennedy Space Center, November 1983. Shown here during the installation of the mesh.
NASA engineers watch Paradigm chief engineer Frank Casten (plaid shirt) and Paradigm engineer Gene Campbell fine tune the 4.8 meter with a spectrum analyzer.
The completed installation of the 4.8 meter antenna with the 3.8 meter Paraclipse in the background.
Mark Fator photographer
Paraclipse™
HIGH PERFORMANCE
SATELLITE TELEVISION SYSTEM
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